IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 09/618,741 Applicant : Thomas M. Hartnett et al. Filed : July 18, 2000 T.C./A.U. : 1731 Examiner : John M. Hoffmann Docket No. : RTN2-118PUS (formerly 07206-118001)	Confirmation No. : 8640

APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

(1) Real party in interest.

The real party of interest is Surmet Corporation, a Massachusetts corporation having a principal place of business in Massachusetts. Raytheon Company, a Delaware corporation, having a place of business in Massachusetts, may have an interest in this patent application.

(2) Related appeals and interferences.

There are no pending patent applications currently under appeal which may be related to the subject patent application.

(3) Jurisdiction

This appeal is taken under 35 U.S.C. 134, from a final rejection mailed August 1, 2008, a petition for a one month extension of time to reply to the final rejection having been filed having been filed and granted on November 20, 2008. A notice of Appeal was filed December 1, 2008. This appeal brief is being filed January 7, 2009.

(4) Table of Contents

(5) Table of Authority

KSR v. Teleflex, 550 U.S. 398 (2007)

(6) Status of amendments.

Two amendments filed after the final rejection mailed August 1, 2008 have been entered.

(7) Grounds for Rejection

Whether Claims 32-86 and 88-93 are unpatentable under 35 U.S.C. 103(a) over Applicant's Prior Art Admission (hereinafter 'APAA') in the paragraph spanning pages 1-2 of the specification, alone or in view of Serpek 1030929 and optionally in view of Feeco.com's webpage on Rotary Kilns and Perry "Chemical Engineers' Handbook".

Whether Claims 32-86, 88-93 are unpatentable under 35 U.S.C. 103(a) over Maguire 4686070 in view of Serpek 1030929 and optionally in view of Feeco.com's webpage on Rotary Kilns and Perry "Chemical Engineers' Handbook".

Whether Claim 86 is unpatentable over Maguire under 35 U.S.C. 103(a) in view of Serpek and optionally in view of Feeco.com's webpage on Rotary Kilns and Perry "Chemical Engineers' Handbook"

Whether Claim 87 is unpatentable under 35 U.S.C. 103 (a) over Maguire in view of Serpek and optionally in view of Feeco.com's webpage

on Rotary Kilns and Perry "Chemical Engineers' Handbook" and further in view of Abstract of JP403023269A or Dodds 5925584.

(8) Statement of Facts.

As stated in the patent application beginning on page 2, line 4 through page 2, line 14:

In accordance with the present invention, a method is provided for making aluminum oxynitride. The method includes: introducing aluminum oxide particles into a chamber, dispersing the particles within the chamber, and forming the aluminum oxynitride including passing nitrogen gas over the dispersed particles.

With such method, large quantities of aluminum oxynitride may be practically produced.

In one embodiment, the method includes a batch rotary process or a semi-continuous rotary process in which a reaction mixture is dispersed or tumbled during reaction. Dispersing the reaction mixture can shorten the reaction time, produce a more uniform AlON composition, and produce a free flowing AlON powder compared to conventional carbothermal nitridation, thereby, e.g., lowering costs of production.

In addition, the semi-continuous process can shorten the time needed to synthesize multiple batches of AlON, for example, by reducing the time

needed to ramp the furnace to a soak temperature, the time needed for the furnace to cool, and the time needed to re-load the retort and to remove the formed AlON from the retort. The semi-continuous process also provides convenient handling of reactants and products.

In another aspect of the invention, a method of making aluminum oxynitride includes introducing a mixture having aluminum oxide and carbon into a chamber, agitating the mixture within the chamber, and heating the mixture to make aluminum oxynitride.

As stated in the patent application beginning on page 3, line 12 through page 2, line 15:

In another aspect of the invention, a continuous method of making aluminum oxynitride includes heating a chamber, continuously introducing a reaction mixture comprising aluminum oxide and carbon into the chamber, agitating the reaction mixture within the chamber, and continuously providing the aluminum oxynitride.

As stated in the patent application beginning on page 4, line 12 through page 4, line 24:

Referring to Fig. 2, the AlON powder is here formed by a batch rotary process. A batch rotary system 10 includes a furnace 20, a cylindrical graphite chamber, here a retort 30 inside furnace 20, and a flow tube 35 for

delivering nitrogen gas into retort 30. Retort 30 is connected to a drive motor 40 via a drive shaft 50 so that motor 40 can rotate retort 30. Retort 30 also defines a plurality of agitator or lifter bars 60 (shown in Figs. 3A-B) on the interior surface of retort 30. Generally, as retort 30 rotates, lifter bars 60 help to disperse a reaction mixture 70 of alumina and carbon within retort 30 by lifting and allowing reaction mixture 70 to fall inside retort 30. It is believed that tumbling mixture 70 during reaction exposes fresh, unreacted mixture 70 to nitrogen, thereby aiding diffusion of nitrogen and shortening the reaction time needed to from AlON.

As stated in the patent application beginning on page 4, line 25 through page 4, line 31:

Reaction mixture 70 is formed by mixing alumina with carbon.

Typically, reaction mixture includes between about 4.5 to about 8% by weight carbon, and more preferably between about 4.5% to about 6.5% by weight carbon. The alumina is a gamma-Al_2O_3 although other forms of alumina, such as, for example, alpha- Al_2O_3 may be used.

As stated in the patent application beginning on page 5, line 24 through page 5, line 25:

After placing a charge of reaction mixture 70 in retort 30, retort 30 is evacuated of air and purged with high purity nitrogen gas.

As stated in the patent application beginning on page 5, line30 through page 6, line 12:

Retort 30 is then rotated by activating drive motor 40, and reaction mixture 70 is heated. The effect of the rotation is to disperse the alumina/carbon particles in the chamber and enable the nitrogen gas to pass around the dispersed particles and thereby facilitate the reaction between the alumina/carbon particles and the nitrogen. Accordingly, the rotation speed should be fast enough to disperse reaction mixture 70 inside retort 30, but not so fast that reaction mixture 70 is centrifuged inside retort 30, thereby preventing the reaction mixture from tumbling. Reaction mixture 70 is heated in the chamber at ramp rate of greater than 10-20 ºC/min to a soak temperature of about 1700-1900 ºC, preferably about 1825 ºC. The soak time is about 10-30 minutes, preferably about 15 minutes. After reaction mixture 70 has soaked at the predetermined soak temperature and for the predetermined soak time, furnace 20 is turned off, and reaction mixture 70, now AlON powder, is allowed to cool, typically taking about 4 hours. The cooled AlON powder is removed from retort 30, and another charge of reaction mixture 70 is added to retort 30 to form another batch of AlON.

As stated in the patent application beginning on page 6, line 17 through page 7, line 21:

In another method of forming AlON, the AlON powder is formed by a semi-continuous rotary process in which the furnace is held at a constant soak temperature for multiple batches of AlON. Referring to Fig. 4, a semi-continuous rotary system 100 includes a furnace 110, a feed hopper 140, a graphite retort 120 inside furnace 110, a drive motor 130, and a collection hopper 160. Furnace 110 includes a nitrogen inlet 112 and a nitrogen outlet 114. When furnace 110 is in use, nitrogen gas flows from inlet 112, through retort 120, and is vented through outlet 114. Feed hopper 140 includes a valve 145 and is used for supplying a reactant mixture 150 (similar to mixture 70) to retort 120. Retort 120, similar in construction to retort 30, is angled downwardly from hopper 140 and is rotatable inside furnace 110 via drive motor 130. Retort 120 includes a graphite plunger 125 moveably located, e.g., extendable to a plurality of positions, inside retort 125. Retort 120 also includes an opening 180 for removing formed AlON powder, as described below. Collection hopper 160 is used for receiving formed AlON powder 170. In operation, furnace 110 is heated to the soak temperature (e.g., about 1700-1900 ºC) and retort 120 (with agitator bars, not shown) is rotating. Here again the retort, or chamber action causes the alumina/carbon particles to disperse. Nitrogen gas flows in inlet 112 and out outlet 114. Plunger 125 is extended past opening 180 so that when reactant mixture 150

is charged into retort 120, mixture 150 is retained in retort 120. Reactant mixture 150, generally the same as reactant mixture 70, is charged into retort 120 from hopper 140 by opening valve 145 until a predetermined amount of mixture 150 is in retort 120. Reaction mixture 150 is dispersed in retort 120 and allowed to react, e.g., for about 10-30 minutes. Thus, here again the nitrogen is able to pass around the dispersed alumina particles. Thus, in this semi-continuous process, multiple batches of AlON can be formed without having to turn furnace 110 on and off for each batch of AlON. This process can shorten the time needed to synthesize multiple batches of AlON by reducing the time needed to ramp the furnace to the soak temperature, the time needed for the furnace to cool, and the time needed to charge the retort and to remove the formed AlON from the retort.

As stated in the patent application beginning on page 7, line 22 through page 8, line 20:

In another method of forming AlON, the AlON powder is formed by a continuous rotary process. Referring to Fig. 6, a continuous rotary system 300 includes a furnace 110, a graphite retort 120 inside furnace 110, a drive motor 130, and a collection hopper 160 for collecting the product mixture 170 (formed AlON). System 300 further includes a feeder 310, a feed hopper 320, a load-lock hopper 330, and a gate valve 340 between feed

hopper 320 and load-lock hopper 330. Retort 120 is similar in construction to the retorts described above, e.g., angling downwardly from feeder 310 and rotatable inside furnace 110 via drive motor 130. Furthermore, retort 120 of system 300 is constructed with sufficient length such that as reaction mixture 150 travels from input end 350 of retort 120 to output end 360 of retort 120, the residence time of mixture 150 in heated retort 120 is sufficient for mixture 150 to form AlON. In other words, retort 120 is made sufficient long such that reaction mixture 150 that is introduced into retort 120 from feeder 310 is converted into AlON 170 by the time the reaction mixture reaches opening 180.

In operation, furnace 110 is heated to the soak temperature and retort 120 is rotating to disperse the alumina/carbon particles that are introduced into retort 120. Nitrogen gas flows in inlet 112 and out outlet 114. With gate valve 340 closed, reactant mixture 150 is loaded into load-lock hopper 330, which is evacuated of air and purged with nitrogen. Reactant mixture 150 is then introduced into feed hopper 320 by opening gate valve 340. Feed hopper 320 introduces mixture 150 into feeder 310, which introduces mixture 150 into retort 120 at a predetermined rate, e.g., volumetrically or gravimetrically. Feeder 310 can be, for example, a screw feeder and shaker feeder. As the charge in feed hopper 320 decreases, more reactant mixture

150 can be provided through load-lock hopper 330, as described above. Feed hopper 320 can be made sufficient large to minimize the frequency at which hopper 320 needs to be re-loaded.

Thus, by selecting the proper dimensions of retort 120 and adjusting the feed rate of reactant mixture 150, the temperature of the furnace 110, and rotation speed of retort 120, system 300 can produce a continuous output of AlON.

(9) Arguments.

Maquire et al., (U.S. Patent No. 4,686,070) points out that the preferred process for forming ALON is as follows:

> The ***aluminum oxide/carbon mixture is placed in an alumina crucible*** and is reacted in an atmosphere of flowing nitrogen at temperatures from 1550ºC to 1850ºC. for up to two hours at the maximum temperature. **The preferred heat treatment is in *two steps*. *In the first step,* a temperature of approximately 1550º C. is used for approximately one hour, whereby, for an appropriate ratio of alumina to carbon, the temperature unstable gamma-aluminum oxide is only partially reacted with carbon and nitrogen to form *both* alpha-aluminum oxide and aluminum nitride. *A one hour soak at 1550ºC. is sufficient to convert the proper amount of Al_2O_3 to AlN*. *In the second step***, a temperature of 1750ºC. or up to the solidus temperature of aluminum oxynitride

> (2140ºC.), is used for approximately 40 minutes, whereby alpha-aluminum oxide and aluminum nitride combine to form cubic aluminum oxynitride. (emphasis added)

AAPA points out in the last paragraph of the Background section:

> As shown in Equation 1, a portion of alumina, carbon, and nitrogen react ***to form aluminum nitride***, and carbon monoxide gas is produced. This reaction can occur at about 1650-1750 ºC. ***The formed aluminum nitride then reacts with alumina, e.g., at about 1750-1850 ºC, to form AlON***. Synthesis of AlON by carbothermal nitridation, e.g., by conventional batch processing, can take up to about 20 to 30 hours to complete.

It is first noted that both Maquire et al., (U.S. Patent No. 4,686,070) and AAPA point out that one first produce aluminum nitride and the react the formed aluminum nitride with alumina to form aluminum oxynitride. TWO-STEP PROCESSES. Clearly, both AAPA and Maguire teach one to first produce AlN and **then take** ***<u>that produced or formed AlN and subsequently process the</u>*** produced or formed AlN with alumina to produce AlON. ***<u>Applicant teaches one to do the entire conversion in a single step. Further, there is no recongition in Serpek, AAPA, or Maquire that one can produce ALON in a single conversion step process.</u>***

It is applicant's position that the Examiner is using hindsight to reach the conclusion that the invention set forth in the claims is obvious under 35 USC 103.

In response to this position the Examiner states in the final rejection mailed August 1, 2008:

> In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin,* 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). Examiner sees nothing in the present arguments which point out how Examiner's hindsight is improper, thus it is presumed examiner's hindsight of the proper sort, that is, the sort necessary for reconstruction.
>
> Examiner understands that it appears that he is asserting the same advantage that applicant discovered - and since this advantage is not recognized in the prior art, it is believed that Examiner used improper hindsight. This is not improper hindsight. Applicant's discovery is a typical engineering discovery: that is, applying routine engineering practices

applicant determined the most economical mode of combining ingredients to produce a desired product. Anyone else trying to maximize the economics of the prior art two-step process would have been motivated to test other known advantageous reactors - in particular because it is one of the most important factors in the economy of a process. Such optimization is generally not considered to be innovation.

As noted above, the Examiner states:

But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin,* 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Now let us consider the "knowledge of the prior art." ***The clear teaching of the prior art is that one would use a drum as Serpek or use the teaching of Feeco.com's webpage on Rotary Kilns and Perry "Chemical Engineers' Handbook at one temperature to FIRST produce AlN and thenAFTER PRODUCING THE AlN, produce ALON from the produced AlN at a different temperature.*** Both AAPA and Maguire teach one to first produce AlN and **then take** ***that produced or formed AlN and subsequently***

process the produced or formed AlN with alumina to produce ALON. ***Applicant teaches one to do the entire conversion in a single step.*** Thus, taking all the "knowledge of the prior art" (i.e., Maquire et al., U.S. Patent No. 4,686,070, AAPA, Feeco.com's webpage on Rotary Kilns and Perry "Chemical Engineers' Handbook), nothing in this prior art recognizes or suggest that ALON be produced in anything other than with a TWO STEP PROCESS.

The Examiner indicates one would use a drum for economy but the prior art teaches that making ALON is a two-step process. There is no recognition that one can produce ALON in one step ***thereby enabling the use of a drum***. The use of a drum for economy ***comes from Applicant's one-step process teaching*** NOT from the two-step process as taught by the prior art. It is the ***Applicant that teaches one to do the entire conversion in a single step-- NOT THE PRIOR ART -- there is no recognition in Serpek, AAPA, or Maquire or*** Feeco.com's webpage on Rotary Kilns and Perry "Chemical Engineers' Handbook ***that one can produce ALON in a single conversion step process.***

Thus, it is respectfully submitted that the Examiner is using "knowledge gleaned only from the applicant's disclosure".

As stated by the Supreme Court in KSR vs. Teleflex cited by the Examiner:

> ***A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon ex post reasoning.*** See *Graham,* 383 U. S., at 36 (warning against a temptation to read into the prior art the teachings of the invention in issue and instructing courts to guard against slipping into the use of hindsight (quoting *Monroe Auto Equipment Co.* v. *Heckethorn Mfg. & Supply Co.,* 332 F. 2d 406, 412, CA6 1964). (emphasis added)

In view of the two-step teaching to produce ALON it appears that the Examiner is using hindsight in reaching his conclusion rather than following the teachings of the prior art, i.e. a teaching of a two-step process to produce ALON. ***That is, using the teaching of the prior art one would use a drum as Serpek at one temperature to produce aluminum nitride AlN and having formed the aluminum nitride, remove the formed aluminum nitride to react the formed aluminum nitride with alumina at a different temperature to produce AlON. As noted above,*** both Maguire et al., (U.S. Patent No. 4,686,070) and AAPA point out that one should first produce aluminum nitride and then react the formed aluminum nitride with alumina to form aluminum oxynitride. TWO-STEP PROCESSES. Certainly it is not the case that processes taught in the prior art to be done in more than one

step be done in a single step. Both AAPA and Maguire teach one to first produce AlN and **then take** ***that produced or formed AlN and subsequently process the produced or formed AlN*** with alumina to produce ALON. ***Applicant teaches one to do the entire conversion in a single step. Further, there is no recongition in Serpek, AAPA, or Maquire that one can produce ALON in a single conversion step process.***

With regard of Feeco.com's webpage on Rotary Kilns and Perry "Chemical Engineers' Handbook, as noted above, both Maquire et al., (U.S. Patent No. 4,686,070) and AAPA point out that one first produce aluminum nitride and then react the formed aluminum nitride with alumina to form aluminum oxynitride. A TWO-STEP PROCESS. Clearly, both AAPA and Maguire teach one to first produce AlN and **then take** ***that produced or formed AlN and subsequently process the*** produced or formed AlN with alumina to produce AlON. ***Applicant teaches one to do the entire conversion in a single step. Further, there is no recognition in Serpek, AAPA, or Maquire that one can produce ALON in a single conversion step process.*** Thus, taking all the art (i.e., Maquire et al., [U.S. Patent No. 4,686,070], AAPA, Feeco.com's webpage on Rotary Kilns and Perry "Chemical Engineers' Handbook), nothing in such art recognizes or suggest that ALON be produced in anything other than with a TWO-STEP

PROCESS. Nothing in Feeco.com's webpage on Rotary Kilns and Perry "Chemical Engineers' Handbook) ***teaches one to do the entire conversion in a single step.***

Thus, it is respectfully submitted that the Examiner is using "knowledge gleaned only from the applicant's disclosure" and is not using the teaching of the prior art, which teaches a two -step process, and the Examiner is therefore using the precise kind of hindsight cautioned against by the Supreme Court.

Referring now to the claims:

Claim 32 points out that the method includes introducing aluminum oxide particles and carbon particles into a chamber; and reacting the aluminum oxide particles and carbon particles introduced into the provided chamber with nitrogen, comprising: mixing the aluminum oxide particles and carbon particles within the provided chamber; passing nitrogen gas over the mixing aluminum oxide particles and carbon particles with the mixing aluminum oxide particles and carbon particles being at a temperature sufficient to convert the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride during the conversion of the

aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride.

Claim 32 points out that the temperature in claim 31 is in a range of about 1700-1900°C.

Claim 34 points out that the method includes introducing aluminum oxide particles and carbon particles into a provided chamber; and reacting the aluminum oxide particles and carbon particles introduced into the provided chamber with nitrogen, comprising: mixing the aluminum oxide particles and carbon particles within the provided chamber; passing nitrogen gas over the mixing aluminum oxide particles and carbon particles with the mixing aluminum oxide particles and carbon particles being at a temperature maintained constant during conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride.

Claim 35 points out that the temperature in claim 34 is in a range of about 1700-1900°C.

Claim 36 points out that the method includes reacting aluminum oxide particles and carbon particles introduced into the provided chamber with nitrogen, comprising: mixing the aluminum oxide particles and carbon particles within the provided chamber; passing nitrogen gas over the mixing aluminum oxide particles and carbon particles; mixing the aluminum oxide

particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles with the mixing aluminum oxide particles and carbon particles being at a constant temperature during conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride; and continuously removing the aluminum oxynitride from the chamber.

Claim 37 points out that the temperature in claim 36 is in a range of about 1700-1900°C.

Claim 38 points out that the method includes reacting the aluminum oxide particles and carbon particles introduced into the provided chamber with nitrogen, comprising: mixing the aluminum oxide particles and carbon particles within the provided chamber; passing nitrogen gas over the mixing aluminum oxide particles and carbon particles with the chamber; and providing a temperature in a range of about 1700-1900°C during conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride.

Claim 39 points out that the method includes reacting the aluminum oxide particles and carbon particles introduced into the provided chamber with nitrogen, comprising: mixing the aluminum oxide particles and carbon particles within the provided chamber; passing nitrogen gas over the mixing

aluminum oxide particles and carbon particles; having the mixing aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles at a temperature selected to convert the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride.

Claim 40 points out that the temperature of the chamber in claim 39 is in a range of about 1700-1900°C.

Claim 41 points out that the method includes reacting aluminum oxide particles and carbon particles introduced into the provided chamber with nitrogen, comprising: mixing the aluminum oxide particles and carbon particles within the provided chamber, passing nitrogen gas over the mixing aluminum oxide particles and carbon particles with the chamber; and having the mixing aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles at a temperature maintained and sufficient to convert the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride during the conversion process.

Claim 42 points out that the temperature in the method recited in claim 36 is in a range of about 1700-1900°C.

Claim 47 points out that the method includes reacting aluminum oxide particles and carbon particles continuously introduced into the provided chamber with nitrogen, comprising: continuously mixing the aluminum oxide particles and carbon particles within the provided chamber; passing nitrogen gas over the mixing aluminum oxide particles and carbon particles with the mixing aluminum oxide particles and carbon particles being at a temperature to continuously convert the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride and wherein the temperature of the mixing aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles is maintained during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride.

Claim 48 points out that the temperature in claim 47 is in a range of about 1700-1900°C.

Claim 53 points out that the method includes reacting aluminum oxide particles and carbon particles continuously introduced into the provided chamber with nitrogen, comprising: continuously mixing and heating the provided chamber with the aluminum oxide particles and carbon particles

within the provided chamber; passing nitrogen gas over the mixing aluminum oxide particles and carbon particles; and wherein heating of the mixing aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles being sufficient to convert the aluminum oxide particles, carbon particles and nitrogen into aluminum oxynitride to convert the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride and wherein the temperature of the mixing aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles is maintained during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride.

Claim 54 points out that the method includes reacting aluminum oxide particles and carbon particles continuously introduced into the provided chamber with nitrogen, comprising: continuously mixing the aluminum oxide particles and carbon particles within the provided chamber; passing nitrogen gas over the mixing aluminum oxide particles and carbon particles; and heating of the mixing aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing

aluminum oxide particles and carbon particles to continuously convert the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride and wherein the temperature of the mixing aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles sufficient to convert the aluminum oxide particles, carbon particles and nitrogen into aluminum oxynitride during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride.

Claim 58 points out that the method includes mixing aluminum oxide particles and carbon particles within a chamber while passing nitrogen gas over the aluminum oxide particles and carbon particles during the mixing with the temperature of the mixing aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles being sufficient to convert the aluminum oxide particles, carbon particles and nitrogen into aluminum oxynitride during conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride.

Claim 59 points out that the temperature of the method recited in claim 58 is in a range of about 1700-1900 ºC.

Claim 60 points out that the method includes introducing aluminum oxide particles and carbon particles into a chamber, mixing the aluminum oxide particles and carbon particles while passing nitrogen gas thereover at a temperature sufficient to form the aluminum oxynitride, and removing said aluminum oxynitride from the chamber.

Claim 61 points out that the temperature recited in claim 60 is within a range of about 1700-1900 °C.

Claim 62 points out that the temperature in claim 60 is held substantially constant.

Claim 63 points out that the temperature in claim 62 is within a range of about 1700-1900 °C.

Claim 64 points out that the aluminum oxide particles and carbon particles are introduced continuously in claim 60 wherein while said aluminum oxynitride is removed continuously.

Claim 65 points out that in claim 64 the temperature is within a range of about 1700-1900 °C.

Claim 66 points out that in claim 64 the temperature is held substantially constant.

Claim 67 points out that in claim 66 the temperature is within a range of about 1700-1900 ºC.

Claim 76 points out that the method includes mixing aluminum oxide particles and carbon particles within a chamber while passing nitrogen gas over the aluminum oxide particles and carbon particles during the mixing with the temperature of the aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles being sufficient to convert the aluminum oxide particles, carbon particles and nitrogen into aluminum oxynitride during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride.

Claim 77 points out that in claim 76 the temperature is within a range of about 1700-1900 ºC during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride.

Claim 78 points out that in claim 76 the temperature is held substantially constant during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride.

Claim 79 points out that in claim 78 the temperature is within a range of about 1700-1900 ºC during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride.

Claim 80 points out that in claim 76 wherein the aluminum oxide particles and carbon particles are introduced continuously while said aluminum oxynitride is removed continuously.

Claim 81 points out that in claim 80 the temperature is within a range of about 1700-1900 ºC during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride.

Claim 82 points out that in claim 80 the temperature is held substantially constant during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride.

Claim 83 points out that in claim 82 the temperature is within a range of about 1700-1900 ºC during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride.

Claim 89 points out that the method includes mixing the aluminum oxide particles and the carbon particles in the chamber to provide a reaction mixture; and heating the mixing reaction mixture at a temperature of between 1700°C and 1900°C for between 10 minutes and 30 minutes while nitrogen gas flows over the mixing reaction mixture to convert the aluminum oxide particles, carbon particles, and nitrogen to aluminum oxynitride.

Claim 90 pints out that the in the method of claim 89 the mixing reaction mixture provided has an initial temperature, the method further

comprising heating the mixing reaction mixture to raise the initial temperature from the initial temperature to the constant temperature.

Claim 91 points out that in claim 90 the temperature is ramped from the initial temperature to the constant temperature.

Claim 92 points out that in claim 91 the ramp rate is at least 10 degrees C per minute.

Claim 93 points out that the method includes introducing aluminum oxide particles and carbon particles continuously into a chamber; continuously rotating the chamber to continuously mix the aluminum oxide particles and carbon particles within the chamber while passing nitrogen gas over the aluminum oxide particles and carbon particles during the mixing with the temperature of the aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles being within a range of about 1700-1900 °C and holding the temperature constant during conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride; and removing the aluminum oxynitride continuously from the chamber.

(10) Claim appendix is attached.

In the event a petition for extension of time is required by this paper and not otherwise provided, such petition is hereby made and authorization is provided herewith to charge deposit account No. 50-3192 for the cost of such extension. In the event any additional fee is required, please charge such amount to Patent and Trademark Office Deposit Account No. 50-3192.

Respectfully submitted,

January 7, 2009
Date

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Appendix
CLAIMS

Claim 32. (rejected) A method of making aluminum oxynitride, the method comprising:

(a) providing a chamber; **{page 4, lines 12-19}**

(b) introducing aluminum oxide particles and carbon particles into the provided chamber; **{page 5, lines 2-24}**

(c) reacting the aluminum oxide particles and carbon particles introduced into the provided chamber with nitrogen, comprising: **{page 5, lines 24-page 6, line 10}**

mixing the aluminum oxide particles and carbon particles within the provided chamber; **{page 5, lines 24-page 6, line 10}**

passing nitrogen gas over the mixing aluminum oxide particles and carbon particles with the mixing aluminum oxide particles and carbon particles being at a temperature sufficient to convert the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride**{page 5, lines 24-page 6, line 10}**; and

(d) removing the aluminum oxynitride from the chamber **{Page 6, lines 10-12}**.

Claim 33. The method recited in claim 32 wherein the temperature is in a range of about 1700-1900°C. **{page 5, lines 5-12}**

Claim 34. (rejected) A method of making aluminum oxynitride, the method comprising:

(a) providing a chamber; **{page 4, lines 12-19**

(b) introducing aluminum oxide particles and carbon particles into the provided chamber; **{page 5, lines 2-24}**

(c) reacting the aluminum oxide particles and carbon particles introduced into the provided chamber with nitrogen, comprising: **{page 5, lines 24-page 6, line 10}**

mixing the aluminum oxide particles and carbon particles within the provided chamber; **{page 5, lines 24-page 6, line 10}**

passing nitrogen gas over the mixing aluminum oxide particles and carbon particles with the mixing aluminum oxide particles and carbon particles being at a temperature

maintained constant during conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride; **{page 5, lines 24-page 6, line 10}**and

(d) removing the aluminum oxynitride from the chamber. **{Page 6, lines 10-12}**

Claim 35. (rejected) The method recited in claim 34 wherein the temperature is in a range of about 1700-1900°C. **{page 5, lines 5-12}**

Claim 36. (rejected) A method of making aluminum oxynitride, the method comprising:

(a) providing a chamber; **{page 4, lines 12-19**

(b) introducing aluminum oxide particles and carbon particles into the provided chamber; **{page 5, lines 2-24}**

(c) reacting aluminum oxide particles and carbon particles introduced into the provided chamber with nitrogen, comprising: **{page 5, lines 24-page 6, line 10}**

mixing the aluminum oxide particles and carbon particles within the provided chamber; **{page 5, lines 24-page 6, line 10}**

passing nitrogen gas over the mixing aluminum oxide particles and carbon particles; **{page 5, lines 24-page 6, line 10}**

mixing the aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles with the mixing aluminum oxide particles and carbon particles being at a constant temperature during conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride; **{page 5, lines 24-page 6, line 10}**and

(d) continuously removing the aluminum oxynitride from the chamber. **{page 7, lines 22-page 8, line 20}**

Claim 37. (rejected) The method recited in claim 36 wherein the temperature is in a range of about 1700-1900°C. **{page 5, lines 5-12}**

Claim 38. (rejected) A method of making aluminum oxynitride, the method comprising:

(a) providing a chamber; **{page 4, lines 12-19**

(b) introducing aluminum oxide particles and carbon particles into the provided chamber; **{page 5, lines 2-24}**

(c) reacting the aluminum oxide particles and carbon particles introduced into the provided chamber with nitrogen, comprising: **{page 5, lines 24-page 6, line 10}**

mixing the aluminum oxide particles and carbon particles within the provided chamber; **{page 5, lines 24-page 6, line 10}**

passing nitrogen gas over the mixing aluminum oxide particles and carbon particles with the chamber; **{page 5, lines 24-page 6, line 10}** and

providing a temperature in a range of about 1700-1900°C during conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride; **{page 5, lines 24-page 6, line 10}**and

(d) removing the aluminum oxynitride from the chamber. **{Page 6, lines 10-12}**

Claim 39. (rejected) A method of making aluminum oxynitride, the method comprising:

(a) providing a chamber; **{page 4, lines 12-19**

(b) introducing aluminum oxide particles and carbon particles into the provided chamber; **{page 5, lines 2-24}**

(c) reacting the aluminum oxide particles and carbon particles introduced into the provided chamber with nitrogen, comprising: **{page 5, lines 24-page 6, line 10}**

mixing the aluminum oxide particles and carbon particles within the provided chamber; **{page 5, lines 24-page 6, line 10}**

passing nitrogen gas over the mixing aluminum oxide particles and carbon particles; **{page 5, lines 24-page 6, line 10}**

having the mixing aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles at a temperature selected to convert the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride; **{page 5, lines 24-page 6, line 10}** and

(d) removing the aluminum oxynitride from the chamber. **{Page 6, lines 10-12}**

Claim 40. (rejected) The method recited in claim 39 wherein the temperature of the chamber is in a range of about 1700-1900°C. **{page 5, lines 5-12}**

Claim 41. (rejected) A method of making aluminum oxynitride, the method comprising:

(a) providing a chamber; **{page 4, lines 12-19}**

(b) introducing aluminum oxide particles and carbon particles into the provided chamber; **{page 5, lines 2-24}**

(c) reacting aluminum oxide particles and carbon particles introduced into the provided chamber with nitrogen, comprising: **{page 5, lines 24-page 6, line 10}**

mixing the aluminum oxide particles and carbon particles within the provided chamber, **{page 5, lines 24-page 6, line 10}**

passing nitrogen gas over the mixing aluminum oxide particles and carbon particles with the chamber; **{page 5, lines 24-page 6, line 10}** and

having the mixing aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles at a temperature maintained and sufficient to convert the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride during the conversion process. **{page 5, lines 24-page 6, line 10}**

Claim 42. (rejected) The method recited in claim 36 wherein the temperature is in a range of about 1700-1900°C. **{page 5, lines 5-12}**

Claim 43. (rejected) The method recited in claim 41 including removing the aluminum oxynitride from the chamber. **{Page 6, lines 10-12}**

Claim 44. (rejected) The method recited in claim 41 including continuously removing the aluminum oxynitride from the chamber. **{page 7, lines 22-page 8, line 20}**

Claim 45. (rejected) The method recited in claim 43 wherein the temperature is in a range of about 1700-1900°C. **{page 5, lines 5-12}**

Claim 46. (rejected) The method recited in claim 44 wherein the temperature is in a range of about 1700-1900°C. **{page 5, lines 5-12}**

Claim 47. (rejected) A method of making aluminum oxynitride, the method comprising:

(a) providing a chamber; **{page 4, lines 12-19**

(b) continuously introducing aluminum oxide particles and carbon particles into the provided chamber; **{page 5, lines 2-24}; page 7, lines 20-21; page 8, lines 4-20}**

(c) reacting aluminum oxide particles and carbon particles continuously introduced into the provided chamber with nitrogen, **{page 5, lines 24-page 6, line 10}** comprising:

continuously mixing the aluminum oxide particles and carbon particles within the provided chamber; **{page 5, lines 24-page 6, line 10; page 7, lines 20-21; page 8, lines 4-20}**

passing nitrogen gas over the mixing aluminum oxide particles and carbon particles with the mixing aluminum oxide particles and carbon particles being at a temperature to continuously convert the aluminum oxide particles, carbon particles and nitrogen into the

aluminum oxynitride and wherein said the temperature of the mixing aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles is maintained during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride. **{page 5, lines 24-page 6, line 10; page 7, lines 20-21; page 8, lines 4-20}**

Claim 48. (rejected) The method recited in claim 47 wherein the temperature is in a range of about 1700-1900°C. **{page 5, lines 5-12}**

Claim 49. (rejected) The method recited in claim 47 including removing the aluminum oxynitride from the chamber. **{Page 6, lines 10-12}**

Claim 50. (rejected) The method recited in claim 47 including continuously removing the aluminum oxynitride from the chamber. **{page 7, lines 22-page 8, line 20}**

Claim 51. (rejected) The method recited in claim 50 wherein the temperature is in a range of about 1700-1900°C. **{page 5, lines 5-12}**

Claim 52. (rejected) The method recited in claim 49 wherein the temperature is in a range of about 1700-1900°C. **{page 5, lines 5-12}**

Claim 53. (rejected) A method of making aluminum oxynitride, the method comprising:

(a) providing a chamber; **{page 4, lines 12-19**

(b) continuously introducing aluminum oxide particles and carbon particles into the provided chamber; **{page 5, lines 2-24}; page 7, lines 20-21; page 8, lines 4-20}**

(c) reacting aluminum oxide particles and carbon particles continuously introduced into the provided chamber with nitrogen, **{page 5, lines 24-page 6, line 10; page 7, lines 20-21; page 8, lines 4-20}** comprising:

continuously mixing and heating the provided chamber with the aluminum oxide particles and carbon particles within the provided chamber; **{page 5, lines 24-page 6, line 10; page 7, lines 20-21; page 8, lines 4-20}**

passing nitrogen gas over the mixing aluminum oxide particles and carbon particles; **{page 5, lines 24-page 6, line 10; page 7, lines 20-21; page 8, lines 4-20}** and

wherein heating of the mixing aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles being sufficient to convert the aluminum oxide particles, carbon particles and nitrogen into aluminum oxynitride to convert the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride and wherein the temperature of the mixing aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles is maintained during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride. **{page 5, lines 24-page 6, line 10; page 7, lines 20-21; page 8, lines 4-20}**

Claim 54. (rejected) A method of making aluminum oxynitride, the method comprising:

(a) providing a chamber; **{page 4, lines 12-19}**

(b) continuously introducing aluminum oxide particles and carbon particles into the provided chamber; **{page 5, lines 2-24; page 7, lines 20-21; page 8, lines 4-20}**

(c) reacting aluminum oxide particles and carbon particles continuously introduced into the provided chamber with nitrogen, comprising:

heating the provided chamber; **{page 5, lines 24-page 6, line 1;, page 7, lines 20-21; page 8, lines 4-20}**

continuously mixing the aluminum oxide particles and carbon particles within the provided chamber; **{page 5, lines 24-page 6, line 10; page 7, lines 20-21; page 8, lines 4-20}**

passing nitrogen gas over the mixing aluminum oxide particles and carbon particles**{page 5, lines 24-page 6, line 10; page 7, lines 20-21; page 8, lines 4-20}**; and

including heating of the mixing aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles to continuously convert the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride and wherein the temperature of the mixing aluminum oxide particles and

carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles sufficient to convert the aluminum oxide particles, carbon particles and nitrogen into aluminum oxynitride during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride. **{page 5, lines 24-page 6, line 10; page 7, lines 20-21; page 8, lines 4-20}**

Claim 55. (rejected) The method recited in claim 54 wherein the mixing comprises rotating the chamber.**{page 5, line 30-page 6, line 5}**

Claim 56. (rejected) The method recited in claim 54 wherein the heating is at a temperature of about 1700°C or higher. **{page 5, lines 5-12}**

Claim 57. (rejected) The method recited in claim 56 wherein the mixing comprises rotating the chamber. **{page 5, line 30-page 6, line 5}**

Claim 58. (rejected) A method of making aluminum oxynitride, the method comprising:

(a) introducing aluminum oxide particles and carbon particles into a chamber; **{page 5 lines 2-24}** and

(b) mixing the aluminum oxide particles and carbon particles within the chamber while passing nitrogen gas over the aluminum oxide particles and carbon particles during the mixing with the temperature of the mixing aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles being sufficient to convert the aluminum oxide particles, carbon particles and nitrogen into aluminum oxynitride during conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride. **{page 5, lines 24-page 6, line 10; page 7, lines 20-21; page 8, lines 4-20}**

Claim 59. (rejected) The method recited in claim 58 wherein the temperature is in a range of about 1700-1900 ℃. **{page 5, lines 5-12}**

Claim 60. (rejected) A process for making aluminum oxynitride comprising:

(a) providing a chamber, **{page 4, lines 12-19**

(b) introducing aluminum oxide particles and carbon particles into the chamber, **{page 5 lines 2-24}**

(c) mixing the aluminum oxide particles and carbon particles while passing nitrogen gas thereover at a temperature sufficient to form the aluminum oxynitride, **{page 5, lines 24-page 6, line 10; page 7, lines 20-21; page 8, lines 4-20}** and

(d) removing said aluminum oxynitride from the chamber. **{Page 6, lines 10-12}**

Claim 61. (rejected) The process recited in claim 60 wherein the temperature is within a range of about 1700-1900 °C. **{page 5, lines 5-12}**

Claim 62. (rejected) The process recited in claim 60 wherein the temperature is held substantially constant. **{page 6, line 5-8}**

Claim 63. (rejected) The process recited in claim 62 wherein the temperature is within a range of about 1700-1900 °C. **{page 5, lines 5-12}**

Claim 64. (rejected) The process recited in claim 60 wherein the aluminum oxide particles and carbon particles are introduced continuously while said aluminum oxynitride is removed continuously. **{page 7, lines 22-page 8 line 20}**

Claim 65. (rejected) The process recited in claim 64 wherein the temperature is within a range of about 1700-1900 ℃. **{page 5, lines 5-12}**

Claim 66. (rejected) The process recited in claim 64 wherein the temperature is held substantially constant. **{page 6, line 5-8}**

Claim 67. (rejected) The process recited in claim 66 wherein the temperature is within a range of about 1700-1900 ℃. **{page 5, lines 5-12}**

Claim 76. (rejected) A method of making aluminum oxynitride, the method comprising:

(a) introducing aluminum oxide particles and carbon particles into a chamber; and **{page 5, lines 2-24}**

(b) mixing the aluminum oxide particles and carbon particles within the chamber while passing nitrogen gas over the aluminum oxide particles and carbon particles during the mixing with the temperature of the aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles being sufficient to convert the aluminum oxide particles, carbon particles and nitrogen into

aluminum oxynitride during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride. **{page 5, lines 24-page 6, line 10; page 7, lines 20-21; page 8, lines 4-20}**

Claim 77. (rejected) The process recited in claim 76 wherein the temperature is within a range of about 1700-1900 °C during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride. **{page 5, lines 5-12}**

Claim 78. (rejected) The process recited in claim 76 wherein the temperature is held substantially constant during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride. **{page 6; line 5-8}**

Claim 79. (rejected) The process recited in claim 78 wherein the temperature is within a range of about 1700-1900 °C during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride. **{page 5, lines 5-12}**

Claim 80. (rejected) The process recited in claim 76 wherein the aluminum oxide particles and carbon particles are introduced continuously while said aluminum oxynitride is removed continuously. **{page 5, lines 24-page 6, line 10; page 7, lines 20-21; page 8, lines 4-20, page 7, lines 22-page 8, line 20}**

Claim 81. (rejected) The process recited in claim 80 wherein the temperature is within a range of about 1700-1900 ºC during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride. **{page 5, lines 5-12}**

Claim 82. (rejected) The process recited in claim 80 wherein the temperature is held substantially constant during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride. **{page 6; line 5-8}**

Claim 83. (rejected) The process recited in claim 82 wherein the temperature is within a range of about 1700-1900 ºC during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride. **{page 5, lines 5-12}**

Claim 84. (rejected) The method of claim 32 , wherein the mixing comprises rotating the chamber.

Claim 85. (rejected) The method of claim 84, further comprising:

forming the aluminum oxynitride into a transparent structure. **{page 10, lines 23-26}**

Claim 86. (rejected) The method of claim 85, wherein forming the aluminum oxynitride comprises:

forming a green body comprising the aluminum oxynitride; and

sintering the green body. **{page 9, line 28-page 10, line 16}**

Claim 87. (rejected) The method of claim 86, further comprising: isostatically pressing the sintered green body under heat. **{page 10, lines 16-22}**

Claim 88. (rejected) The method of claim 32, wherein the aluminum oxynitride comprises $Al_{23-1/3x}O_{27+x}N_{5-x}$, where $0.429 \leq x \leq 2$. **{page 1, lines 5-6}**

Claim 89. (rejected) A method of making aluminum oxynitride, the method comprising:

(a) introducing aluminum oxide particles and carbon particles into a chamber; **{page 5 lines 2-24}**

(b) mixing the aluminum oxide particles and the carbon particles in the chamber to provide a reaction mixture; **{page 5, lines 24-page 6, line 10; page 7, lines 20-21; page 8, lines 4-20}**

(c) heating the mixing reaction mixture at a temperature of between 1700°C and 1900°C for between 10 minutes and 30 minutes while nitrogen gas flows over the mixing reaction mixture to convert the aluminum oxide particles, carbon particles, and nitrogen to aluminum oxynitride; **{page 5, lines 24-page 6, line 10; page 7, lines 20-21; page 8, lines 4-20}** and

(d) removing the aluminum oxynitride from the chamber. **{Page 6, lines 10-12}**

Claim 90. (rejected) The method of claim 89, wherein the mixing reaction mixture provided in step (b) has an initial temperature, the method further comprising heating the mixing reaction mixture to raise the initial

temperature from the initial temperature to the constant temperature. **{page 5, line 30-page 6, line 12}**

Claim 91. (rejected) The method recited in claim 90 wherein the temperature is ramped from the initial temperature to the constant temperature. **{page 6, lines 5-7}**

Claim 92. (rejected) The method recited in claim 91 wherein the ramp rate is at least 10 degrees C per minute. **{page 6, lines 5-7}**

Claim 93 (rejected) A method of making aluminum oxynitride, the method comprising:

(a) introducing aluminum oxide particles and carbon particles continuously into a chamber; **{page 5, lines 2-24}**

(b) continuously rotating the chamber to continuously mix the aluminum oxide particles and carbon particles within the chamber while passing nitrogen gas over the aluminum oxide particles and carbon particles during the mixing with the temperature of the aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles being within a range of about 1700-1900

°C and holding the temperature constant during conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride; **{page 5, lines 24-page 6, line 10; page 7, lines 20-21}** and

removing the aluminum oxynitride continuously from the chamber. **{page 5, lines 24-page 6, line 10; page 7, lines 20-21; page 8, lines 4-20}**